

REMARKS

After entry of this amendment, claims 1, 5, 8-11, 13, 15, 18, 19, 21, 25, 29, 32, 34, 41, 45, 47, 49, and 51-52 are pending, of which claims 21, 25, 34, 41, and 45 are withdrawn. Claims 51 and 52 have been added and find support *inter alia* in claims 1 and 29, respectively. Further support is found in the specification at page 58, lines 6-9 and lines 12-16. No new matter has been added. Claims 5, 18, 19, 32, 47, and 49 have been amended without prejudice or disclaimer to remove the non-elected subject matter. Further support for the amendment made to the definition of "homolog" in these claims is found in the specification at page 19, lines 1-6, page 19, line 27 to page 20, line 23, and page 60, Table 6. Claims 1 and 29 have been amended and find support at page 8, lines 12-26, page 13, lines 18-21, and page 58, lines 6-9 and lines 12-16. Claims 13 and 15 have been amended to correct the antecedent basis and find support *inter alia* in the original claims 13 and 15. Further support for the amendment made to claim 18 is found at page 36, line 27, to page 37, line 5. Claim 19 has been further amended as suggested by the Examiner. Claim 34 has been amended and finds support at page 58, lines 6-9 and lines 12-16. Further support for the amendment made to claim 47 is found at page 13, lines 18-21, page 17, lines 1-4, and page 22, lines 10-15. Further support for the amendment made to claim 49 is found at page 13, lines 18-21, and page 46, lines 19-23. No new matter has been added.

In the specification, at page 1, a section entitled "RELATED APPLICATIONS" and a section entitled "SUBMISSION ON COMPACT DISC" have been inserted at page 1 to cross-reference the related applications and to add the required paragraph for submission of Sequence Listing only on compact disc, respectively. Additional section captions have been inserted into the specification at pages 1 and 6. Furthermore, the figure legends originally placed at pages 78-79 have been deleted, and reinserted at page 8. Amendments have been made to the original figure legends to identify the abbreviations used in the figure legends of Figures 1, 2, 5, 8, and 11. Support is found *inter alia* in the specification at page 60, Table 6. Further amendments have also been made to the figure legends of Figures 3-4, 6-7, 9-10, and 12-13 to provide the sequence identifying numbers, so as paragraphs at pages 50-51 and 58-59, to comply with 37 CFR § 1.821(a) and (d) as suggested by the Examiner. All sequences recited in the specification are included in the substitute Sequence Listing enclosed with this response. Moreover, full

citation for McKersie and Leshem (1994) at page 63, Example 5, of the specification has been provided as requested by the Examiner. No new matter has been added.

Applicants submit herewith replacement copies of the Sequence Listing (COPY 1 and COPY 2) that conform to 37 CFR §§ 1.821-1.825 and the Sequence Listing in computer readable form, all on compact disc, accompanied by a Statement to Support Filing and Submission in Accordance with 37 CFR §§ 1.821-1.825. No new matter has been added to the Sequence Listing. Entry of this Sequence Listing into the application is respectfully requested.

While preparing this response to the Official Action, Applicants noticed that the abbreviations used in Figures 9 and 13 were inadvertently truncated and did not represent the full Gene ID as provided in Table 6. Applicants submit herewith Replacement Sheets containing Figures 8-10 and Figures 11-13 that correspond to Figures 8-10 and 11-13 as originally filed, respectively, with Figures 9 and 13 being corrected. Annotated Sheets Showing Changes are also attached. Support for the amendments made in Figure 9 is found *inter alia* in the specification at page 60, Table 6, page 78, lines 29-37, and Figures 8 and 10. Support for the amendment made in Figure 13 is found *inter alia* in the specification at page 60, Table 6, page 79, lines 1-9, and Figures 11-12. No new matter has been added. Entry of the Replacement Sheets of drawings is respectfully requested.

Claim Objections

The Examiner objected to various points in the claims. In view of the present claim amendments, the objections are believed to be rendered moot.

Double Patenting

Claims 1, 5, 8-11, 13, 15, 18, 19, 29, 32, 47, and 49 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as unpatentable over claims 2, 10-12, 15, 16, 19, and 22-27 of co-pending Application No. 11/251,208. Applicants propose to overcome this rejection by filing a terminal disclaimer upon the indication of otherwise allowable subject matter.

Claim Rejection – 35 U.S.C. § 112

Claims 5, 18, 32, 47, and 49 were rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness. In view of the present claim amendments, Applicants believe the objections are rendered moot.

Claim Rejections – 35 U.S.C. § 112

Claims 1, 5, 8-11, 13, 15, 18, 19, 29, 32, 47, and 49 were rejected under 35 U.S.C. § 112, first paragraph, for lack of an enabling disclosure and allegedly failing to comply with the written description requirement. Applicants respectfully disagree and traverse the rejections.

Enablement Rejections

Claims 1, 5, 8-11, 13, 15, 18, 19, 29, 32, 47, and 49 were rejected for allegedly not enabling sequence variants, homologs, or parts of SEQ ID NO: 3. Applicants respectfully disagree. However, to expedite prosecution, the claims have been amended without prejudice and disclaimer to recite the consensus sequences of motifs found in the subfamily of glutaredoxins containing SEQ ID NO: 4, which represents the amino acid sequence encoded by the sequence SEQ ID NO: 3. The claims encompass that sequence and homologs which share a sequence identity of at least 80% at the amino acid level with the sequence of SEQ ID NO: 4 and have the activity of an ORSRP.

Furthermore, it is submitted that the claims as amended recite a scope of subject matter which a skilled artisan could clearly make and use according to the teaching in the specification. As described in the specification, “non-essential” amino acid residues can be altered from the wild-type sequence of glutaredoxin or thioredoxin without altering the enzymatic activity. See Specification at page 19, lines 8-26. For instance, conservative amino acid substitution having a similar side chain can be used to replace non-essential amino acid residues. Specification at page 21, lines 19-22. From this guidance and the guidance of “consensus sequences” as disclosed, the skilled artisan would be directed to mutations least likely to impair function. Methods of introducing such mutations, such as site-directed mutagenesis and PCR-mediated mutagenesis as described in the specification at page 21, lines 7-22, are standard techniques readily available and known to those skilled in the art. It is further submitted that the screening and selecting a homolog with the specified sequence homology and function is routine to those skilled in the art. Thus, in view of the amendments, and further in view of the guidance provided in the

specification, Applicants respectfully submit that the specification is enabling for the claimed subject matter.

The Examiner further rejected the claims as not enabling for increasing plant tolerance to any environmental stress. In response, Applicants have amended the claims to recite that one or more of the specified environmental stresses are improved in the plant cell or plant. In view of the amendments, reconsideration and withdrawal of this rejection is respectfully requested.

Rejections to claims 1 and 29, and 47 and 49 are believed to be rendered moot in view of the claim amendments.

Written Description Rejection

Claims 1, 5, 8-11, 13, 15, 18, 19, 29, 32, 47, and 49 were further rejected for allegedly lack of adequate written description with regard to sequence variants, homologs, or parts of SEQ ID NO: 3. The Examiner asserted that the specification fails to describe the structure of the claimed genus, nor does the specification provide a correlation between the structure of the genus and the function of imparting stress tolerance in a transgenic plant. The Examiner further asserted that the specification fails to identify conserved functional domains shared by the members of the claimed genus. Applicants respectfully disagree.

The claims as now amended recite the glutaredoxin or thioredoxin protein to comprise certain motif domains defined by consensus sequences and represent common structure of the transgenes which correlates to the function which transgenes confer to the plant cells and plants as being claimed. In light of the amendments, reconsideration and withdrawal of this rejection is respectfully requested.

Claim Rejection – 35 U.S.C. § 102

Claims 1, 5, 8-11, 13, 15, 18, 19, 29, 32, and 47 are rejected under 35 U.S.C. § 102(b) as being anticipated by Lanahan et al. Applicants respectfully disagree.

Please note initially that the claims as amended are drawn to a transgenic plant cell or plant, or a method of producing the same, using an ORSRP encoding nucleic acid coding for a glutaredoxin or thioredoxin protein comprising at least one of the four motif domains with defined consensus sequences. The claims as amended further define the ORSRP encoding nucleic acid sequence as one encoding a protein with a particular amount of sequence identity

with SEQ ID NO: 4. Lanahan et al. disclose a transgenic plant expressing a nucleotide sequence encoding a heat-stable thioredoxin and a method of producing the same, but do not teach a transgenic plant which expresses a glutaredoxin or thioredoxin protein as now claimed.

Therefore, it is submitted that Lanahan et al. do not anticipate the claimed invention.

Reconsideration and withdrawal of the rejection is respectfully requested.

Claim Rejection – 35 U.S.C. § 103

Claims 1, 5, 8-11, 13, 15, 18, 19, 29, 32, 47, and 49 are rejected under 35 U.S.C. § 103(a) as being obvious over Gan, in view of Valvekens et al. and Grant et al. Applicants respectfully disagree for the following reason.

To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. See MPEP § 2143.03. It is submitted that Gan, Valvekens et al., and Grant et al., alone or in combination, do not disclose or teach all the claim limitations.

Gan discloses the identification, cloning and sequencing of a yeast glutaredoxin gene having a nucleic acid sequence sharing 100% identity with the sequence of SEQ ID NO: 3. However, Gan does not teach or suggest a transgenic plant with such a nucleic acid sequence.

Valvekens et al. generally teach a method for an efficient plant cell transformation and regeneration of transgenic plants.

Grant et al. teaches that the expression of yeast glutaredoxins GRX1 and GRX 2 is enhanced under various stress conditions, which suggests that GRX1 and GRX2 may play a role in “response to various stress conditions” or “protecting against oxidative stress” in yeast. See p. 33, Abstract, and p. 41, Discussion. Grant et al. do not teach or suggest that yeast GRX2, which corresponds to SEQ ID NO: 4, would improve tolerance to stresses when transgenically expressed in a plant cell or plant as claimed.

Thus, absent the hindsight afforded by a reading of Applicants’ disclosure, it could not have been predicted that transforming a plant cell or plant with yeast glutaredoxin GRX2 coding sequence or related sequences would confer improved stress tolerance of the types claimed. It would have been only speculative whether a plant cell or plant transformed with yeast glutaredoxin GRX2 would exhibit increased tolerance to environmental stresses since yeast is

not an art-acceptable model for plant study. Accordingly, the subject matter as claimed would not have been obvious. Reconsideration and withdrawal of the obviousness rejection is respectfully requested.

CONCLUSION

In view of the above remarks and further in view of the above amendments, Applicants respectfully request withdrawal of the rejections and allowance of the claims.

Applicants reserve all rights to pursue the non-elected claims and subject matter in one or more divisional applications, if necessary.

Accompanying this response is a petition for a one-month extension of time to and including May 25, 2007 to respond to the Office Action mailed January 25, 2006 with the required fee authorization. No further fees are believed due. If any additional fee is due, the Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 03-2775, under Order No. 13311-00012-US from which the undersigned is authorized to draw.

Respectfully submitted,

By 

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Annotated Sheet Showing Changes (Figure 8-10)

Fig. 8

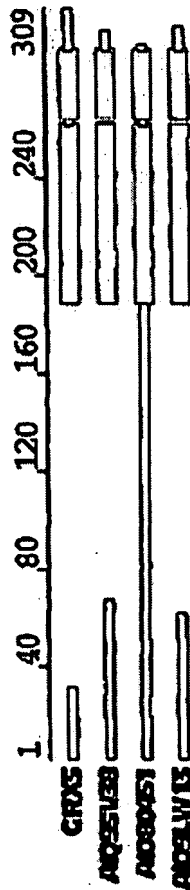


Fig. 9

GRX5 (30) - GRX (30) LSTKRAIEDATESAPWLFMKGIPFPPKCFESRATIGLIGNQGVDPKFAAYVWLEDPFELREGIKESSENP
AQ9SV38 (67) - Q9SV (67) LTRQKJLEKLANSEKAWLFMKGIRDFMCFNSNIVQILKNLWPFEDNILENEMLRQGLKEYSNWPFP
AQ80451 (189) - Q804 (189) LTVPLEELJDRUMKESKAWAFKGSRSAPQCFSSQFVWGHLESQGVDEIVDMLEENHGLREILKNYSNP
AQ9LW13 (61) - Q9LW (61) SIDLKDIIVENDVKINFWMIYMKGVPESEQCFESSLAVRMLQQVNPISRNILLEDQELKNAVKSFSNWPFP

Fig. 10

GRX5 (108) QLYVNKEFIGGCVITSMARSGHIALDL
AQ9SV38 (140) QLYIGGEFFGGCDITLEAFKGTGELQEE
AQ80451 (265) QIFVRGELVGGCDILTSMYENGELANI
AQ9LW13 (130) QIFIKGEFIGGCDILNMHKEGELEBOK



Annotated Sheet Showing Changes (Figure 11-13)

Fig. 11

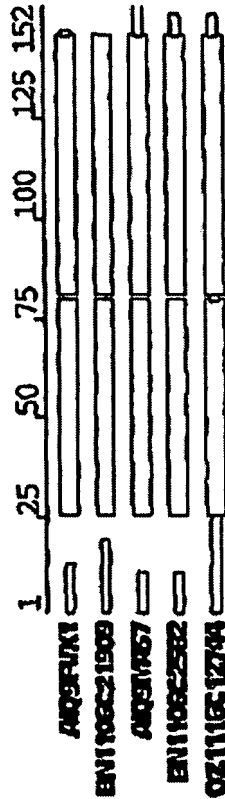


Fig. 12

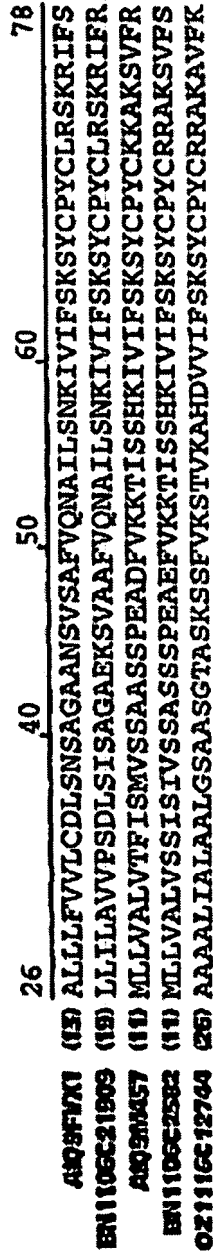


Fig. 13

